

CALIFORNIA DEPARTMENT OF PESTICIDE REGULATION
PUBLIC REPORT 2006-5

Propamocarb Hydrochloride
Tracking ID Number 192184

DESCRIPTION OF ACTION

Bayer Cropscience LP submitted an application seeking California registration of Previcur Flex Fungicide, EPA Reg. No. 264-678. Previcur Flex Fungicide is a fungicide labeled for field applications on potatoes, tomatoes, cucurbits, and lettuce (leaf and head) and greenhouse applications on tomatoes, cucurbits, peppers, and leaf lettuce. Previcur Flex Fungicide contains the new active ingredient propamocarb hydrochloride.

The Department of Pesticide Regulation (DPR) evaluated the product label and data and found them acceptable to support conditional registration. Precautionary and first aid statements on the product label, as well as label directions requiring personal protective equipment (PPE) and other protective measures adequately mitigate potential health risks to persons who may come in contact with the pesticide during application. DPR does not expect significant adverse environmental impacts to result from registration of Previcur Flex Fungicide. The U.S. Environmental Protection Agency (U.S. EPA) registered Previcur Flex Fungicide on September 29, 2000.

BACKGROUND

Registrant:	Bayer Cropscience LP
Common name:	Propamocarb hydrochloride
Chemical name:	propyl [3-(dimethylamino) propyl] carbamate hydrochloride
Brand name:	Previcur Flex Fungicide
Uses:	To control fungus on potatoes and other vegetable crops
Pests controlled:	<i>Phytophthora infestans</i> , <i>Alternaria solani</i> , and <i>Pythium</i> spp.
Type of registration:	Conditional

Previcur Flex Fungicide is a liquid formulation containing 66.5% propamocarb hydrochloride as the active ingredient (a.i.). The active ingredient is a carbamate; however, it is not a methyl carbamate and does not inhibit cholinesterase. Previcur Flex Fungicide is a systemic pesticide that is taken into treated crop plants through the leaves and stems. Through its mode of action the active ingredient, propamocarb hydrochloride, effects the permeability of the fungal cell membrane, and also interferes with synthesis of phospholipids and fatty acids within the cell. Previcur Flex Fungicide is intended for field application to potatoes, tomatoes, cucurbits, and lettuce (leaf and head) in a tank-mixture with contact fungicides. Previcur Flex Fungicide is also labeled for greenhouse applications on tomatoes, cucurbits, peppers, and leaf lettuce, in rotation with other fungicides, but not as a tank mix.

SCIENTIFIC REVIEW

A. Chemistry

1. **Product Chemistry:** DPR evaluated the submitted chemistry studies for Previcur Flex Fungicide. The results are summarized in Table I.

Table I. Physical and Chemical Properties of Previcur Flex Fungicide

Properties	Values
Physical state	Liquid
Density (20°)	1.083 grams (g)/milliliter (ml) (Bulk)
PH (1% solution)	4.7 @ 25°C
Solubility a.i. (water)	>90 g/100 ml @ unspecified temp
Vapor pressure a.i.	6.1 X 10 ⁻⁷ mm Hg (25°C)
pKa (1% solution)	9.3 @ 25°C
Henry's Law Constant 20°C	8.50 x 10 ⁻¹⁴ atm-m ³ /mole
Stability	Stable at 54°C for 14 days and for 11 yr 8 mo at 20°C
Corrosion Characteristics	Corrodes iron, copper and brass

Submitted product chemistry data support registration of Previcur Flex Fungicide.

2. **Residues in Food and Animal Feed:** An adequate residue analytical method was submitted. The U.S. EPA established tolerances in 40 Code of Federal Regulations (CFR) § 180.499 for residues of propamocarb hydrochloride of 0.06 parts per million (ppm) on potatoes. Submitted data indicate the residues of propamocarb hydrochloride are not likely to exceed the 0.06 ppm tolerance level on potatoes.
3. **Environmental Fate:** The propamocarb hydrochloride environmental fate data include studies on soil adsorption, aerobic soil metabolism, anaerobic soil metabolism, and field dissipation. The studies were found to be satisfactory. However, when compared with the U.S. EPA and California EPA criteria for predicting the potential of a chemical to reach ground water, the submitted studies indicated that propamocarb hydrochloride has the potential to leach as summarized in the following table:

Table II. Comparison of U.S. EPA and California EPA Groundwater leaching criteria with Environmental Fate study results for propamocarb hydrochloride.

	U.S. EPA	California EPA		
Parameter	Potential to Leach Value	Potential to Leach Value	Experimental Value	Criteria Exceeded
Water Solubility	> 30 ppm	> 3 ppm	> 90 g/100 ml	Yes
Soil Adsorption Coefficient (Kp)	< 5 ml/g		0.671-5.20 ml/g	Yes
Koc		<1,900 ml/g	41-359 ml/g	Yes

Hydrolytic Half Life	> 30 days	> 14	Stable	Yes
Aerobic Soil Metabolic Half Life	> 21 days	> 610 days	5.1-18.6 days	No
Anaerobic Soil Metabolic Half Life	> 21 days	> 9 days	Terrestrial: 459 days Aquatic: 92.4 days	Yes
Field Dissipation Half life	> 21 days		16.5-88.8 days	

All specific numerical values, except for aerobic soil metabolism, exceed the potential leach values. These data show that aerobic soil metabolism is the only significant mechanism for the environmental dissipation of propamocarb hydrochloride. Because of the potential environmental concerns noted above, Previcur Flex Fungicide was routed to the Environmental Monitoring and Pest Management (EMPM) Branch for review. The EMPM evaluation scientist concluded that the test application rates far exceeded the specified maximum label rates. Consequently, the leaching depth at the maximum label rates would be considerably lower than those reported in the dissipation studies. It was determined that Previcur Flex Fungicide is unlikely to present a serious threat to California groundwater when used according to the label use directions. The submitted product, environmental fate, and residue chemistry data support registration of Previcur Flex Fungicide .

B. Toxicology

Bayer Cropscience LP submitted adequate toxicology studies to conduct complete toxicological evaluations of Previcur Flex Fungicide. DPR evaluated the submitted data to determine the potential for adverse health effects. The acute toxicity parameters for Previcur Flex Fungicide are summarized in the following table.

Table III. Acute Toxicity of Previcur Flex Fungicide

Type of Study	Acute Toxicity Values	Acute Toxicity Category
Acute Oral	LD ₅₀ 2000-2900 mg/kg	III
Acute Dermal	LD ₅₀ >3000 mg/kg	III
Acute inhalation	LC ₅₀ >5.54 mg/l	IV
Primary eye irritation	N/A	IV
Primary dermal irritation	N/A	IV
Dermal Sensitization	N/A	Sensitizer
Signal word	N/A	CAUTION

DPR's evaluation of the acute toxicity studies indicates that the studies are adequate for a complete toxicological evaluation. The product label adequately identifies the potential acute toxicity hazards indicated by the data reviewed. The first aid statements and PPE are adequate for the indicated acute toxicity hazards.

DPR found the submitted toxicology studies for propamocarb hydrochloride sufficient to satisfy the data requirements of the Birth Defects Prevention Act (Food and Agricultural Code section 13121 et al). Possible adverse effects were noted in the chronic dog toxicity and rat teratology studies. DPR prioritizes pesticide active ingredients for risk assessment based on the nature of the potential adverse health effects, number of potential adverse effects, number of species

affected, no effect levels (NOELs), potential for human exposure, use patterns and similar factors. Based on these criteria, pesticides with the greatest potential for health problems are placed in high priority, with other chemicals being in moderate or low priority. The purpose of the risk assessment would be to appraise the potential for propamocarb hydrochloride to cause adverse health effects in humans if exposed to the pesticide as a result of legal use. At this time, propamocarb hydrochloride has not been prioritized by DPR for risk assessment. Further toxicity information is available for propamocarb hydrochloride at DPR's public website in the Summary of Toxicology Data, available on DPR:
<http://www.cdpr.ca.gov/docs/toxsums/pdfs/4022.pdf>.

C. Health & Safety

An evaluation of the medical management information on the Previcur Flex Fungicide label and the acute toxicity study results indicate that the product label bears all of the required statements and warnings regarding safety to handlers and other persons who may be exposed to the pesticide. The product label bears an adequate First Aid statement. In addition, the product label requires applicators and other handlers to wear long sleeved shirt and long pants, chemical resistant gloves, and shoes plus socks. The label instructs handlers to wash Personal Protective Equipment (PPE) separately from other laundry, and to wash their hands before eating, drinking, chewing gum, using tobacco, or using the toilet. The label also prohibits worker reentry into treated areas during the restricted entry interval (REI) of 12 hours.

D. Fish & Wildlife

The registrant submitted fish and wildlife toxicity studies, including studies on bluegill sunfish, rainbow trout, *Daphnia magna*, sheepshead minnow, mysid shrimp, oysters, bobwhite quail and mallard ducks. The submitted data are adequate to characterize the toxicity to wildlife and aquatic animals from an environmental exposure. Table III summarizes the results of these studies.

Table IV. Summary of Fish & Wildlife Toxicity Values**

Test Animal	Type of Study	Acute Toxicity Value	Relative Toxicity
Bobwhite quail	Single acute oral dose	>2770 mg/kg (LD ₅₀)	Relatively non-toxic
Mallard duck	Feeding study (5 day)	>7202 mg/kg (LC ₅₀)	Relatively non-toxic
Bobwhite quail	Feeding study (5 day)	>7202 mg/kg (LC ₅₀)	Relatively non-toxic
Bobwhite quail	Reproduct study (21 wk)	8,450 ppm NOEC	Relatively non-toxic
Mallard duck	Reproduct study (21 wk)	1,600 ppm NOEC	Relatively non-toxic
Bluegill sunfish	Water exposure (96 hrs)	>95 mg a.i./l (LC ₅₀)	Slightly-toxic
Rainbow trout	Water exposure (96 hrs)	>99 mg a.i./l (LC ₅₀)	Slightly-toxic
<i>Daphnia magna</i>	Water exposure (48 hrs)	>106 mg a.i./l (LC ₅₀)	Relatively non-toxic
Sheepshead minnow	Water exposure (96 hrs)	>100 mg a.i./l (LC ₅₀)	Relatively non -toxic
Eastern oyster	Water exposure (96 hrs)	>43.9 mg a.i./l (LC ₅₀) 12 mg a.i./l (NOEC)	Slightly-toxic
Flathead minnow	Water exposure (33 day)	6.3 mg a.i./l (NOEC) 13 mg a.i./l (LOEC)	Relatively non-toxic
<i>Daphnia magna</i>	Water exposure (21 day)	12.3 mg a.i./l (NOEC) 24.7 mg a.i./l (LOEC)	Relatively non-toxic
Honey Bee	Single acute oral dose	>151 µg a.i./bee (LD ₅₀)	Relatively non-toxic

**The test substance used for the studies was the technical active ingredient.

The data indicate that propamocarb hydrochloride is relatively non-toxic to birds, Sheepshead minnows, *Daphnia magna*, and honey bees, and slightly-toxic to bluegill sunfish, and rainbow trout, and oysters. To mitigate the hazards to aquatic organisms the Previcur Flex Fungicide label contains the environmental hazard warning “Do not apply directly to water, to areas where surface water is present, or to intertidal areas below the high water mark. Do not contaminate water when disposing of equipment washwater. Do not apply when weather conditions favor drift from the treated areas.”

E. Efficacy & Phytotoxicity

Submitted efficacy and phytotoxicity studies indicate that Previcur Flex Fungicide provides effective control of late blight (*Phytophthora infestans*) in potato production. It exhibits systemic activity and is active against the metalaxyl resistant late blight pathogen. Product labeling allows ground equipment application and application through irrigation systems at up to 1.2 pt./A at 7-10 day intervals when atmospheric conditions favor disease. The maximum application is no more than 6 pints (4.5 lbs. a.i./acre) in a single growing season.

For increased efficacy, the product label recommends using Previcur Flex Fungicide in a tank-mixture with other fungicides. The product can be mixed with chlorothalonil, maneb, or mancozeb in a minimum of 15 gallons of water per acre. The product labeling contains directions for jar testing to determine compatibility with tank mix chemicals that have not been fully investigated.

When Previcur Flex Fungicide was originally submitted for registration, Bayer Cropscience LP intended to market the product for late blight control on potatoes. However, the applicant subsequently submitted an amended label, which contained the following new sites: tomatoes, cucurbits, lettuce, and peppers. No new efficacy data were submitted to support use on these new use sites. DPR’s evaluator found that the submitted efficacy and phytotoxicity data were adequate to support conditional registration of Previcur Flex Fungicide. The conditional registration is contingent upon the registrant’s submission of phytotoxicity data for each of the added crops, within one year. During testing the highest rates of application, shortest application intervals, and most concentrated spray solutions should be included to approximate worst-case use scenarios.

ALTERNATIVES

Previcur Flex Fungicide is a liquid fungicide for field applications on potatoes, tomatoes, cucurbits, and lettuce (leaf and head), and greenhouse applications on tomatoes, cucurbits, peppers, and leaf lettuce. The product provides systemic control of fungi, including late blight (*Phytophthora infestans*) and early blight (*Alternaria solani*), downy mildew, and *Phytophthora* fruit rots, which cause seed, seedling, root and stem rots and foliar diseases. Previcur Flex Fungicide contains propamocarb hydrochloride, which is a carbamate fungicide. It is a systemic pesticide that is taken into treated crop plants through the leaves and stems. Through its mode of action the active ingredient propamocarb hydrochloride effects the permeability of the fungal cell membrane, and also interferes with synthesis of phospholipids and fatty acids within the cell.

Previcur Flex Fungicide is a useful addition as a fungicide, as it provides low mammalian toxicity and reduced environmental hazards. Previcur Flex Fungicide mixes well with most contact fungicides, and as a tank mix it can be used in Integrated Pest Management (IPM) programs intended to minimize disease resistance to fungicides. Because the chemical's mode of action is different from other fungicides, it provides efficacy against fungal strains that have developed resistance to other fungicides.

CONCLUSION

DPR evaluated the product label and scientific data submitted to support the registration of Previcur Flex Fungicide. The label and data were found acceptable to support conditional registration. The acute health risks to human from exposure to propamocarb hydrochloride are minimal due to its low mammalian toxicity. The precautionary and first aid statements on the product label, and the recommended protective measures mitigate potential health risks to persons who may be exposed to these pesticides. If a risk assessment conducted by DPR determines that exposure to propamocarb hydrochloride may result in unacceptable margins of exposure, further restrictions will be placed on the use of propamocarb hydrochloride at that time. Submitted data indicate that no significant adverse environmental impacts are expected to occur from the use of Previcur Flex Fungicide and that when used in accordance with label directions, the products will be effective for the intended use.

Conditional registration is recommended for Previcur Flex Fungicide contingent upon submission, by the registrant, of phytotoxicity data on tomatoes, cucurbits, lettuce, and peppers within one year. The phytotoxicity data should be developed at the highest rates of application, shortest application intervals, and most concentrated spray solutions to approximate worst-case use scenarios.